

### REMARKS

Applicant has carefully reviewed the Office Action of October 28, 2004, and offers the following remarks to accompany the above amendments. Applicant appreciates the telephonic interview of November 18, 2004 with Examiner Hoang, when some of the following issues were discussed. Where appropriate, the interview is referenced below.

Before turning to the rejections set forth in the Office Action, Applicant provides a brief summary of the present invention so as to assist the Patent Office in considering the responses set forth below. The present invention is designed to identify misfires or other combustion inefficiencies in a multi-cylinder engine. Specifically, the present invention is designed to identify which particular cylinder within the multi-cylinder engine is misfiring or suffering from a combustion inefficiency. To make this identification, the present invention uses (in the preferred embodiment) an oxygen sensor to detect peaks in the oxygen levels within the exhaust stream. The peak of the oxygen level is then linked to the firing of a particular cylinder. In one embodiment, this linkage is made through comparison of the "fingerprint" of the oxygen in the exhaust stream to a "fingerprint" of the oxygen in the exhaust stream for a similar engine with a known misfire. In another embodiment, the linkage may be made by calculating which cylinder's stroke created the exhaust that is currently passing the oxygen sensor. This calculation may be done by knowing *a priori* how long it takes the exhaust to reach the oxygen sensor, subtracting this time from the time at which the peak was sensed, and then matching the resulting time to the timing of the crankshaft to determine which cylinder was responsible for that exhaust.

Claims 1-17 were rejected under 35 U.S.C. § 102 as being anticipated by Bochum et al. (hereinafter "Bochum"). Applicant respectfully traverses. For the Patent Office to establish anticipation, the Patent Office must show where each and every element of the claim is located in the reference. Furthermore, the elements of the reference must be arranged as claimed. MPEP § 2131.

During the telephonic interview of November 18, 2004, Applicant explained the nature and purpose of the present invention and asked the Examiner for clarification as to where claim 1's "linking the peak in the oxygen level to a particular cylinder in the engine" is located in Bochum. Specifically, Applicant pointed out that while there is a lambda sensor 13 (a lambda sensor being a type of oxygen sensor) in Bochum, and the lambda sensor 13 reports to the

control system 16, the control system 16 does not link the output of the lambda sensor to a particular cylinder. Rather, the control system 16 adjusts uniformly the A/F ratio for each cylinder based on the readings of the lambda sensor. This adjustment of the A/F ratio is not linked to a particular cylinder and thus, there is no "linking the peak in the oxygen level to a particular cylinder in the engine..." as recited in the claims.

In response to Applicant's arguments, the Examiner replied that "linking" was a very broad term and could be construed a number of different ways. Applicant admits this statement as true in the abstract. However, the claim term interpretations are limited to what someone of ordinary skill in the art would consider reasonable. MPEP § 2111. Under a reasonable analysis by someone of ordinary skill in the art, there is no "linking" of a peak in the oxygen level in an exhaust stream to a particular cylinder in the engine.

Regardless of the breadth of "linking", during the interview, the Examiner was unable to identify a "linking" element in the reference. Thus, the element is not present in Bochum. Since the element is not present in Bochum, Bochum does not anticipate claim 1. Since Bochum does not anticipate claim 1, Applicant requests allowance of claim 1 and claims 2-12, which depend from claim 1.

Claim 5 deserves special mention in that it recites "associating each of the multiple cylinders with a unique oxygen sensor." Thus, claim 5 requires multiple oxygen sensors. Bochum only shows a single oxygen sensor and as such does not anticipate claim 5. The Patent Office admits this deficiency in the analysis of claim 18. This deficiency in Bochum's disclosure constitutes an independent reason why Applicant requests allowance for claim 5 at this time.

Claim 8 deserves special mention in that it recites "inferentially detecting an oxygen level." Bochum discloses a lambda sensor which directly detects oxygen levels. The Patent Office has not identified any portion of Bochum which teaches or suggests inferential detection of an oxygen level. As such, Bochum does not teach or suggest the recited claim element. This deficiency in Bochum's disclosure constitutes an independent reason why Applicant requests allowance for claim 8 at this time.

Claims 9-12 recite additional features related to how the linking is done. As the Examiner felt that "linking" by itself was broad, Applicant invites the Patent Office to revisit these claims. The generic concept of the linking recited in the claim is not shown by Bochum, much less the more detailed particulars of claims 9-12. As such, these claims provide

independent elements which are not shown by Bochum. Applicant requests claim allowance for claims 9-12 on this basis as well.

After discussing claim 1's "linking" language, and the lack of linkage between the peak in the oxygen level and a particular cylinder in the engine, the telephonic interview of November 18, 2004 turned to claim 13's recitation of a database of fingerprints. During the telephonic interview, the Examiner opined that a database of fingerprints could be any sort of collection of data, and further opined that the pressure sensor readings comprised a database of fingerprints, while directing Applicant's attention to column 7 of Bochum. Applicant has studied column 7 of Bochum and finds no teaching of a database of fingerprints for the pressure sensor. Rather, column 7, lines 19-27 describe a calculation process based on the measurement of the pressure sensor, and this calculation is not a database of fingerprints. To this extent, Applicant respectfully maintains that Bochum does not disclose a database of fingerprints as recited in claim 13.

Even if Bochum does teach a database of fingerprints (a point which Applicant does not concede), this database of pressure reading fingerprints is not compared to "a sensed oxygen level coupled with a timing reference" as recited in claim 13. To this extent, Bochum does not show the claim element recited by claim 13, and Bochum cannot anticipate claim 13. Applicant requests withdrawal of the § 102 rejection of claim 13 and claims 14-17, which depend from claim 13, at this time.

Claim 15 deserves special mention in that it recites that the software is adapted to "output an indication that the combustion inefficiency is linked to a particular cylinder of the engine." As explained above, Bochum does not provide any linkage between a combustion inefficiency such as a misfire and a particular cylinder in the engine. Applicant requests withdrawal of the § 102 rejection of claim 15 at this time for this reason.

Claims 18-20 were rejected under 35 U.S.C. § 103 as being unpatentable over Bochum. Applicant respectfully traverses. For the Patent Office to establish obviousness, the Patent Office show where each and every claim element is taught or suggested in the prior art. MPEP § 2143.03.

While claim 18 was not specifically discussed during the telephonic interview, the same comments made above apply to claim 18. Specifically, claim 18 recites that the "onboard computer [is] adapted to determine if a given cylinder has a combustion inefficiency based on

peaks in oxygen sensed by said oxygen sensors." The Patent Office's analysis of claims 18-20 does not address where in Bochum this element can be found. Applicant respectfully maintains that Bochum does not teach this element, and the Patent Office was not able to articulate where in the reference the element is taught. Since the reference does not teach the element, the Patent Office has not established *prima facie* obviousness, and the claims are allowable.

Claim 19 deserves special mention in that it recites detecting oxygen levels inferentially. As discussed above, Bochum does not show inferential oxygen level detection and thus cannot teach this element. Thus, claim 19 is independently patentable, and should be allowed for this reason.

Applicant adds new claims 21-24, which recite further details about the linking of claim 1. No new matter is added. As explained above, Bochum does not teach this linking, much less the particular linking recited in new claims 21-24. Applicant requests consideration of the claims and claim allowance at the Examiner's earliest convenience.

Applicant further adds new claims 25 and 26 which recite further details about the database of fingerprints. These claims are added to further clarify that the alleged database of fingerprints in Bochum is not Applicant's database of fingerprints. As explained above, Bochum does not teach the database of fingerprints, much less the particular database of fingerprints recited in new claims 25 and 26. Applicant requests consideration of the claims and claim allowance at the Examiner's earliest convenience.

Applicant requests reconsideration of the rejections. During the telephonic interview, the Examiner indicated that a new search might be required to find the "linking the peak in the oxygen level to a particular cylinder in the engine" of claim 1, or the comparing the database of fingerprints to the sensed oxygen level and the timing reference of claim 13. In the absence of additional evidence, the references of record do not show these claim elements or the comparable claim element in claim 18. Applicant earnestly solicits claim allowance at the Examiner's earliest convenience.

Respectfully submitted,

WITHROW & TERRANOVA, P.L.L.C.

By:



Taylor M. Davenport  
Registration No. 42,466  
P.O. Box 1287  
Cary, NC 27512  
Telephone: (919) 654-4520

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